

CLAIMS

1. A method for making a spark plug comprising a center electrode disposed in a bore formed in a ceramic insulator, a metallic shell fitting outside the ceramic insulator, and a ground electrode forming a spark gap with the center electrode, the method comprising steps of:

providing a metal strip which extends from an end of the metal shell, said metal strip being for forming said ground electrode;

positioning a spacer above a firing end of the center electrode;

- 10 preliminarily bending the metal strip toward the spacer so as to form an arc portion in the metal strip;

and then precisely forming a gap-distance between the metal strip and the firing end of the center electrode by applying a force to the metal strip.

- 15 2. A method according to claim 1, further comprising a step of:

measuring the position of the firing end of the center electrode so as to determine a position for the spacer.

3. A method according to claim 2, wherein,

- 20 a clearance between the spacer and the firing end of the center electrode is determined based on the measured position of the center electrode.

- AD 4. A method according to claim 1 or 2, further comprising a step of:

- 25 retrieving the spacer after bending the metal strip so that the gap-distance between the metal strip and the center electrode is able to be adjusted to a required

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M value by referring to a position of the preliminary bent metal strip and the position of the firing end of the center electrode.

5. A method according to claim 1, 2, 3 or 4, further comprising a step of:

5 welding a metal plate tip to a lateral side of the metal strip for a ground electrode after providing the metal strip extending from the end of the metal shell and before positioning the spacer above the firing end of the center electrode, the metal plate tip being a spark-erosion resistant metal which includes Pt, Ir, Rh, Pd, Re, Os, Ru, Ni or alloy thereof.

10. 6. A method according to any one of the preceding claims, wherein, a clearance between the spacer and the firing end is maintained during the step of bending the metal strip so as to protect the firing end of the center electrode.

15 7. A method according to any one of the preceding claims, wherein, the firing end of the center electrode is made of a tip having a diameter in the range of from 0.3 to 1 mm.

8. A method according to claim 7, wherein, 20 the tip is comprises a metal selected from the group consisting of Pt, Ir, Rh, Pd, Re, Os, Ru or an alloy thereof.

AI 9. A method according to any one of the preceding claims, wherein the spacer has a rounded portion toward which the metal strip is bent by a punch, in said preliminary bending step. 25

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AD 10. A method according to any one of the preceding claims, further comprising the steps of:

storing information relating to the position of the firing end of the center  
5 electrode in a computer memory; and  
using said information for positioning the spacer.

11. A method according to any one of the preceding claims, further comprising the steps of:

10 storing information relating to the position of the firing end of the center electrode in a computer memory; and  
using said information for precisely forming a gap-distance between the metal strip and the firing end of the center electrode.

15 12. A method according to any one of the preceding claims, wherein the position for the spacer is determined by positional information of the firing end of the center electrode, the positional information being determined with reference to a position of a part constituting the spark plug.

20 13. A method according to any one of the preceding claims, wherein positional information of the firing end of the center electrode is measured by use of a position-detecting sensor using a laser.

14. A method according to any one of the preceding claims, wherein the force  
25 applied to the metal strip for precisely forming the gap distance is caused by a die

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moving in parallel with a center electrode axis.

15. A method according to any one of the preceding claims, wherein the arc portion to be formed in the metal strip by positioning the spacer is located at substantially the same level as the firing end of the center electrode.

16. An apparatus adapted to perform the method according to any one of the preceding claims.

17. An apparatus for making a spark plug comprising a center electrode disposed in a bore formed in a ceramic insulator, a metallic shell fitting outside the ceramic insulator, and a ground electrode forming a spark gap with the center electrode, the apparatus comprising:

means for positioning a spacer above a firing end of the center electrode;

means for preliminarily bending a metal strip toward the spacer so as to form an arc portion in the metal strip, said metal strip being provided extending from an end of the metal shell and being for forming said ground electrode; and

means for precisely forming a gap-distance between the metal strip and the firing end of the center electrode by applying a force to the metal strip.

18. An apparatus according to claim 17, further comprising a position-detecting sensor incorporating a laser, for measuring positional information of the firing end of the center electrode.

19. An apparatus according to claim 17 or 18, further comprising a visual-image

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A' processor for detecting information on said gap-distance.

20. An apparatus according to claim 18 or 19, further comprising a memory for storing said measured positional information and/or said detected gap-distance  
5 information.

21. An apparatus according to claim 18, 19 or 20, further comprising a CPU for controlling said means for positioning said spacer, said means for preliminarily bending said metal strip and said means for precisely forming said gap-distance,  
10 based on said measured and/or stored information.

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